81. High-speed pulse generators

High-speed pulse generators having both of the following characteristics:

(a) Output voltage greater than 6 V into a resistive load of less than 55-ohms; and

(b) 'Pulse transition time' less than 500 ps.

TECHNICAL NOTE

In item 81(b) 'pulse transition time' is defined as the time interval between 10% and 90% voltage amplitude.

82. Pulse amplifiers

Pulse amplifiers having all of the following characteristics:

(a) Gain greater than 6 dBs;

(b) Baseband bandwidth greater than 500 MHz (having the low frequency half-power point at less than 1 MHz and the high frequency half-powered point greater than 500 MHz); and

(c) Output voltage greater than 2 volts into 55 ohms or less. (This corresponds to an output greater than 16 dBm in a 50 ohm system.)

83. Photomultiplier tubes

Photomultiplier tubes having both of the following characteristics:

(a) Photocathode area of greater than 20 cm^2; and

(b) Anode pulse rise time of less than 1 ns.

84. Frequency changers

Frequency changers or generators (also known as converters or inverters), other than those specified in item 23.4, having all of the following characteristics:

(a) A multiphase output capable of providing a power of 40W or greater;

(b) Capable of operating in the frequency range between 600 and 2000 Hz;

(c) Total harmonic distortion better (less) than 10%; and

(d) Frequency control better (less) than 0.1%.

85. Bellows-sealed valves

Valves having all of the following characteristics:

(a) Nominal size of 5 mm or greater;

(b) Having a bellows seal or a diaphragm; and

(c) Wholly made of or lined with aluminium, aluminium alloy, nickel, or nickel alloy containing more than 60% nickel.

TECHNICAL NOTE

For valves with different inlet and outlet diameter, the nominal size parameter in item 85(a) refers to the smallest diameter.

86. Scroll compressors and vacuum pumps

Bellows-sealed scroll compressors and bellows-sealed scroll-type vacuum pumps in which all surfaces that come in contact with the process gas are made from any of the following materials: aluminium, aluminium alloy, aluminium oxide, stainless steel, nickel, nickel alloy, phosphor bronze, and fluoropolymers.

87. Ion accelerators

Ion accelerators having both of the following characteristics:

(a) Capable of accelerating ions to energies between 120 MeV and 20 GeV; and

(b) Having a figure of merit (K) of 82.0 or greater.

TECHNICAL NOTE

The figure of merit K is defined as $K=I(E-120)$, where I is the average accelerator beam current in mA and E is the final energy in MeV.

81. High-speed pulse generators

High-speed pulse generators having both of the following characteristics:

(a) Output voltage greater than 6 V into a resistive load of less than 55-ohms; and

(b) 'Pulse transition time' less than 500 ps.

TECHNICAL NOTE

In item 81(b) 'pulse transition time' is defined as the time interval between 10% and 90% voltage amplitude.

82. Pulse amplifiers

Pulse amplifiers having all of the following characteristics:

(a) Gain greater than 6 dBs;

(b) Baseband bandwidth greater than 500 MHz (having the low frequency half-power point at less than 1 MHz and the high frequency half-powered point greater than 500 MHz); and

(c) Output voltage greater than 2 volts into 55 ohms or less. (This corresponds to an output greater than 16 dBm in a 50 ohm system.)

83. Photomultiplier tubes

Photomultiplier tubes having both of the following characteristics:

(a) Photocathode area of greater than 20 cm^2; and

(b) Anode pulse rise time of less than 1 ns.

84. Frequency changers

Frequency changers or generators (also known as converters or inverters), other than those specified in item 23.4, having all of the following characteristics:

(a) A multiphase output capable of providing a power of 40W or greater;

(b) Capable of operating in the frequency range between 600 and 2000 Hz;

(c) Total harmonic distortion better (less) than 10%; and

(d) Frequency control better (less) than 0.1%.

85. Bellows-sealed valves

Valves having all of the following characteristics:

(a) Nominal size of 5 mm or greater;

(b) Having a bellows seal or a diaphragm; and

(c) Wholly made of or lined with aluminium, aluminium alloy, nickel, or nickel alloy containing more than 60% nickel.

TECHNICAL NOTE
For valves with different inlet and outlet diameter, the nominal size parameter in item 85(a) refers to the smallest diameter.

86. Scroll compressors and vacuum pumps

Bellows-sealed scroll compressors and bellows-sealed scroll-type vacuum pumps in which all surfaces that come in contact with the process gas are made from any of the following materials: aluminium, aluminium alloy, aluminium oxide, stainless steel, nickel, nickel alloy, phosphor bronze, and fluoropolymers.

87. Ion accelerators

Ion accelerators having both of the following characteristics:

(a) Capable of accelerating ions to energies between 120 MeV and 20 GeV; and

(b) Having a figure of merit (K) of 82.0 or greater.

TECHNICAL NOTE
The figure of merit K is defined as $K=I(E-120)$, where I is the average accelerator beam current in mA and E is the final energy in MeV.

APPENDIX 1: GENERAL PRINCIPLES

The description of an item in the Annex includes any such item, whether in new or used condition.

Where the description of any item in Annex 3 contains no qualifications or specifications, it is regarded as including all varieties of that item. Category captions are only for convenience of reference and do not affect the interpretation of item definitions.

The objective of these controls should not be defeated by the transfer of component parts.

The objectives of these controls should not be defeated by the transfer to Iraq of any non-controlled item (including plants) containing one or more controlled components when the controlled component or components are the principal element of the item and can be removed or used for other purposes. In judging whether the controlled component or components are to be considered principal elements, licensing authorities should weigh the factors of quantities, value and technological know-how involved and other special circumstances which might establish the controlled component or components as the principal element of the item being procured.

APPENDIX 2: TECHNOLOGY AND SOFTWARE CONTROLS

The transfer of "technology" or "software" directly associated with any item in Annex 3 will be subject to as great a degree of scrutiny and control as the item itself. The transfer of "technology" or "software" for prohibited items is also prohibited.

The licensing for transfer to Iraq of any item in Annex 3 which is not proscribed to Iraq may entail the transfer to the same end user of the minimum "technology" or "software" required for the installation, operation, maintenance and repair of the item.

Controls on transfers of "software" do not apply to:

(a) Software generally available to the public being:

(i) sold from stock at retail selling points without restrictions; and

(ii) designed for installation by the user without further substantial support by the supplier; or

(b) Software "in the public domain".

APPENDIX 3: LIST OF NUCLEAR ACTIVITIES PERMITTED UNDER SECURITY COUNCIL RESOLUTION 707

ANNEX 4 of the OMV Plan is reproduced for convenience.

ANNEX 4
LIST OF NUCLEAR ACTIVITIES PERMITTED UNDER SECURITY COUNCIL RESOLUTION 707

The following peaceful applications of isotopes imported from other States after prior approval by the IAEA are permitted:

1. AGRICULTURAL APPLICATIONS

1.1. Soil fertility, irrigation and crop production

1.2. Plant breeding and genetics

1.3. Animal production and health

1.4. Insect and pest control

1.5. Food preservation

1.6. Other uses as approved by the IAEA

2. INDUSTRIAL APPLICATIONS

2.1. Radiography and other non-destructive testing methods

2.2. Industrial process control and quality control

2.3. Radiotracer applications in oil, chemical and metallurgical processes

2.4. Development of water and mineral resources

2.5. Industrial radiation processing

2.6. Other uses as approved by the IAEA

3. MEDICAL APPLICATIONS

3.1. Diagnostic and therapeutic medicine including dosimetry

3.2. Radiotherapy by teletherapy and brachytherapy

3.3. Nutrition and health-related environmental studies

3.4. Other uses as approved by the IAEA

APPENDIX 4 : DEFINITIONS

'Accuracy'

Usually measured in terms of inaccuracy, defined as the maximum deviation, positive or negative, of an indicated value from an accepted standard or true value.

'Basic scientific research'

Experimental or theoretical work undertaken principally to acquire new knowledge of the fundamental principles of phenomena and observable facts, not primarily directed toward a specific practical aim or objective.

'Depleted Uranium'

Uranium in which the abundance ratio of the isotope uranium-235 is less than that occurring in natural uranium, e.g. uranium in spent fuel from natural uranium fuelled reactors and tails from uranium enrichment processes.

'Development'

is related to all phases before 'production' such as:

- design
- design research
- design analysis
- design concepts
- assembly and testing of prototypes
- pilot production schemes
- design data
- process of transforming design data into a product
- configuration design
- integration design
- layouts

'Direct-Use Material'

Nuclear material that can be used for the manufacture of nuclear explosives components without transmutation or further enrichment, such as plutonium containing less than 80% plutonium-238, HEU and uranium-233. Chemical compounds, mixtures of direct-use materials (e.g. MOX) and plutonium contained in spent fuel also fall into this category. Unirradiated direct-use material would require less processing time and effort than irradiated direct-use material (contained in spent fuel).

'Enriched Uranium'

Uranium having a higher abundance ratio of the isotope uranium-235 than natural uranium. Enriched uranium is considered as special fissionable material.

'High Enriched Uranium (HEU)'

Uranium enriched to 20% uranium-235 or more. HEU is considered as special fissionable material and as direct-use material.

'In the public domain'

'In the public domain', as it applies herein, means 'technology' or 'software' that has been made available without restrictions upon its further dissemination. (Copyright restrictions do not remove 'technology' or 'software' from being 'in the public domain'.)

'Linearity'

(Usually measured in terms of non-linearity) is the maximum deviation of the actual characteristic (average of upscale and downscale readings), positive or negative, from a straight line so positioned as to equalize and minimize the maximum deviations.

'Low Enriched Uranium (LEU)'

Uranium enriched to less than 20% uranium-235.

'Microprogram'

A sequence of elementary instructions, maintained in a special storage, the execution of which is initiated by the introduction of its reference instruction into an instruction register.

'Mixed Oxide (MOX)'

A reactor fuel consisting of a mixture of the oxides of uranium and plutonium. MOX is used for recycling reprocessed spent fuel (after separation of waste) into thermal nuclear reactors (thermal recycling) and as a fuel for fast breeder reactors. MOX is considered special fissionable material and as direct-use material.

'Natural Uranium'

Uranium as it normally occurs in nature, having an atomic weight of approximately 238 and containing minute quantities of uranium-234, 0.7% uranium-235 and 99.3% uranium-238.

'Plutonium'

A radioactive element which occurs only in trace amounts in nature, with atomic number 94 and symbol Pu. As produced by irradiating uranium fuels, plutonium contains varying percentages of the isotopes 238, 239, 240, 241, and 242. Plutonium is considered as special fissionable material and direct-use material.

'Production'

means all production phases such as:

- construction
- production engineering
- manufacture
- integration
- assembly (mounting)
- inspection
- testing
- quality assurance

'Program'

A sequence of instructions to carry out a process in, or convertible into, a form executable by an electronic computer.

'Software'

A collection of one or more 'programs' or 'microprograms' fixed in any tangible medium of expression.

'Source Material'

- The term "Source Material" means uranium containing the mixture of isotopes occurring in nature; uranium depleted in the isotope 235; thorium; any of the foregoing in the form of metal, alloy, chemical compound, or concentrate.
- The term "source material" is interpreted as not applying to ore or ore residue, in particular to yellowcake, a concentrate consisting essentially of U_3O_8.

'Specially Designed Software'

Refers to the minimum operating systems, diagnostic systems, maintenance systems, and application software necessary to be executed on particular equipment to perform the function for which it was designed. To make other incompatible equipment perform the same function requires:

- modification of this software or
- addition of programs

'Special Fissionable Material'

- The term "Special Fissionable Material" means plutonium-239; uranium-233; uranium enriched in the isotopes 235 or 233; any material containing one or more of the foregoing. The term special fissionable material does not include source material.

- The term "Uranium Enriched in the Isotopes 235 or 233" means uranium containing isotopes 235 or 233 or both in an amount such that the abundance ratio of the sum of these isotopes to the isotope 238 is greater than the ratio of the isotope 235 to the isotope 238 occurring in nature.

'Technical assistance'

'Technical assistance' may take forms such as: instruction, skills, training, working knowledge, consulting services.

NOTE
'Technical assistance' may involve transfer of 'technical data'.

'Technical Data'

'Technical data' may take forms such as blueprints, plans, diagrams, models, formulae, engineering designs and specifications, manuals and instructions written or recorded on other media or devices such as disk, tape, read-only memories.

'Technology'

means specific information required for the 'development', 'production', or 'use' of any item contained in the List. This information may take the form of 'technical data' or 'technical assistance'.

'Uranium-233'

An isotope of uranium which is produced by transmutation of thorium-232 and which is considered as special fissionable material and as direct-use material.

'Use'

Operation, installation (including on-site installation), maintenance (checking), repair, overhaul, and refurbishing.

APPENDIX 5: INTERNATIONAL SYSTEM OF UNITS AND ABBREVIATIONS

The International System of Units (SI) is used in this Annex. In all cases the physical quantity defined in SI units should be considered the official recommended control value. However, some machine tool parameters are given in their customary units, which are not SI.

Commonly used abbreviations (and their prefixes denoting size) in this Annex are as follows:

A----------ampere(s)
Bq ---------- becquerel(s)
°C ----------degree(s) Celsius
CA---- chemical abstracts service
Ci -- ---------- curic(s)
cm ----------centimetre(s)
dB ---------- decibel(s)
dBm decibel referred to 1 milliwatt
g ---------- gram(s)
g acceleration of gravity (9.81 m/s^2)
GBq ---------- gigabecquerel(s)
GH ---------- gigahertz
GPa ---------- gigapascal(s)
Gy ---------- gray
h ----------hour(s)
Hz ----------hertz
J---------- joule(s)
K----------kelvin
keV ----thousand electron volt(s)
kg ----------kilogram(s)
kHz----------kilohertz
kN ---------- kilonewton(s)
kPa ---------- kilopascal(s)
kV ---------- kilovolt(s)
kW ----------kilowatt(s)
m ---------- metre(s)
mA ---------- milliampere(s)
MeV ----- million electron volt(s)
MHz ---------- megahertz
ml ---------- millilitre(s)
mm ---------- millimetre(s)
MPa ---------- megapascal(s)
mPa---------- millipascal(s)
MW ---------- megawatt(s)
µF ----------microfarad(s)
µm ---------- micrometre(s)
µs ----------microsecond(s)
N ---------- newton(s)
nm ---------- nanometre(s)
ns---------- nanosecond(s)
nH---------- nanohenry(ies)
ps ---------- picosecond(s)
RMS ---------- root mean square
rpm ------- revolutions per minute
s ---------- second(s)
T ---------- tesla(s)
TIR -------- total indicator reading
V ---------- volt(s)
W ----------watt(s)

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